

NOAA | National Ocean Service | National Centers for Coastal Ocean Science
Center for Coastal Environmental Health & Biomolecular Research
Center for Coastal Monitoring & Assessment

In partnership with

NOAA's Fishery Service, Office of Response and Restoration, the US Environmental Protection Agency and the US Geological Survey

AN INTERAGENCY RESPONSE TO ASSESS ENVIRONMENTAL IMPACTS OF HURRICANE KATRINA

NOAA and its EPA, USGS and state partners (e.g., Dauphin Marine Lab) have initiated an integrated response to assess the environmental impacts of Hurricane Katrina throughout the affected region, with much of the effort being directed towards characterizing the magnitude and extent of coastal contamination that has resulted from this unprecedented storm. Efforts are currently underway on three fronts to measure chemical and microbial contaminants in water, sediments, and fish and shellfish tissues in the coastal marshes and waters offshore of Louisiana, Mississippi, and Alabama and to assess both human-health and ecological impacts associated with these stressors. Furthermore, a fourth effort to assess the implications of elevated contamination levels on seafood safety is in the early planning stages. This is a critical component as well, first and foremost, because of the enormous human-health concerns, and secondarily because of potential economic losses from the affected oyster, shrimp, crab, and finfish fisheries of the region. This document provides a brief description of the various components of this comprehensive interagency effort.

1) Joint EPA Coastal Condition Assessment of Hurricane Katrina Impacts Using National Coastal Assessment (NCA) protocols

Objectives: a) Assess the ecological condition and trends in condition of coastal Louisiana, Mississippi, and Alabama associated with the Hurricane and its aftermath, b) support local, state, and national efforts to assess aquatic resources, identify the stressors that cause harm or deterioration of these resources, restore ecological condition, and protect human health.

Summary: EPA will provide the lead on this interagency effort to collect water samples, sediment samples, and benthic infaunal samples using standard protocols and indicators incorporated in their National Coastal Assessment (NCA) program. Post-hurricane conditions measured one month after the storm (early October 2005) and subsequently throughout the year will be compared to pre-hurricane conditions, based on prior NCA assessments, to provide a basis for assessing initial environmental impacts and recovery. NOAA's National Centers for Coastal Ocean Science (NCCOS) will provide support with field work, toxicity testing (Microtox and P450 assays), analysis of microbial and contaminant indicators, and data-analysis and reporting. Analytical support will include the analysis of samples for coliform bacteria and other human pathogens in addition to the analysis of chemical contaminants (e.g., pesticides, herbicides, and emerging contaminants of concern such as PBDEs) known to pose human health risks and that will supplement the standard NCA suite of contaminants (metals, conventional pesticides, PAHs, PCBs).

A total of 30 sites will be sampled in the coastal waters between Lake Borgne in the west to Mobile Bay in the east (Figure 1). Dauphin Island Marine Lab will assist with the collection of samples at the eastern end of the study area (approximately four sites) and the EPA and NCCOS team will sample the remainder of the 30 sites. The USGS will collect additional samples in the highly impacted waters of

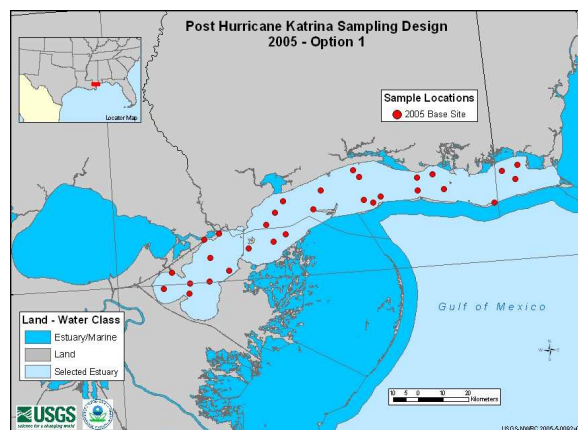


Figure 1. EPA cruise sample sites

Lake Pontchartrain. Measures of chemical contamination and organic loading (nutrients, organic matter, chlorophyll) will be obtained at each of the stations. In addition, because of the considerable amounts of untreated sewage that has entered this coastal system, the team also will assess the abundance and distribution of coliform bacteria and other human pathogens. Benthic community analyses and sediment toxicity tests will be performed as well to evaluate the degree to which contaminant burdens and organic loading resulting from this storm have impacted biological resources.

2) Joint NOAA National Marine Fisheries Service and Atlantic Oceanographic and Meteorological Laboratory (AOML) cruise (Ongoing)

Objectives: a) Gather oceanographic data on plumes from the Mississippi river and emanating from Lake Pontchartrain, b) collect fish tissues for contaminant and pathogen analyses, c) collect sediments for contaminant analysis, d) survey for stranded marine mammals and reptiles, e) collect water chemistry to assess potential for harmful algal blooms (HABs).

Summary: NOAA's AOML has provided leadership on this NOAA cruise to collect water samples, sediment samples, and biological samples. NCCOS will provide analytical support for the analysis of sediment chemistry, including the pesticides, herbicides, and emerging contaminants of concern listed above. The cruise plan initially called for sampling at the mouth of the Mississippi River and stations TBD off Chandeleur Sound and Mississippi Sound (Figure 2). Fish sampling was designed to coordinate with NMFS fishery independent survey track lines, and at stations of opportunity where there was evidence of significant runoff. Sediment sampling target areas were based on available data on grain size and bathymetry, in addition to areal and satellite imagery indicating primary plume behavior. Combined with data that will result from the joint EPA/NOAA/USGS surveys, this ongoing effort will add to the broader characterization of environmental contamination and its impacts in the region.



Figure 2. Joint AOML NMFS cruise map

3) NOAA National Status and trends Program (NS&T) Mussel Watch Project

Objectives: a) Measure contaminant burdens in the tissues of Oysters in the region, b) measure sediment contamination in the substrates surrounding oyster beds, c) assess the implications of oyster tissue contamination on human health.

Summary: NCCOS's NS&T Program supports ecosystem-based management through an integrated program of environmental monitoring, assessment, and research to describe the current status of pollution and to detect changes in the environmental quality of our Nation's estuarine and coastal waters. These interrelated activities are designed to provide National context to measures of local and regional environmental condition. Mussel Watch principals have developed and are currently implementing a response strategy to assess the environmental impacts of Hurricane Katrina as expressed through sediment contamination concentrations and contaminant body burdens measured in the tissues of the American oyster (*Crassostrea virginica*). The NS&T Mussel Watch Project has a 20 year time series for over 120 contaminants in mussels from over 300 sites nationwide, including the sites shown in Figure 3. While these sites are generally monitored during the winter months, NS&T has moved up its sampling schedule to begin during the last week of September in the Katrina impact zone. A total of 20 Mussel Watch sites will be sampled during this response effort.

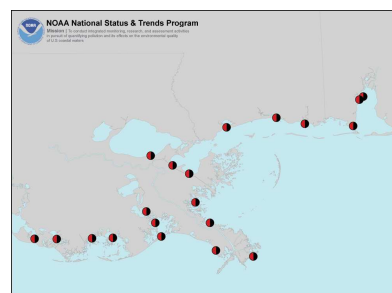


Figure 3. NS&T sample sites.

At each of the sites (Figure 3), Mussel Watch scientists will collect sediment and oyster tissue samples that will then be analyzed for the standard suite of NS&T Program analytes, including conventional pesticides, metal, PAHs, and PCBs. In addition, NS&T will measure the concentrations of polybrominated flame retardants (i.e., PBDEs), triazine herbicides (i.e., Atrazine), and insecticides (i.e., Fipronil), as well as *Clostridium perfringens*, a pathogenic microorganism which is widely distributed in the environment where spores of the organism persist in soil, sediments, and areas subject to human or animal fecal pollution. While these are not standard NS&T measurements, they conform to broader suite of proposed activities presented herein (by all of the partners).

4) Seafood Safety Monitoring

Objectives: To work with the Gulf Coast States and NOAA's Office of Response and Restoration (ORR) to develop and implement a cogent strategy for addressing shellfish and other seafood safety issues in the region.

4.1 Working with State Agencies:

NCCOS is currently in the process of contacting personnel in LA, MS, and AL, State agencies of public health and natural resources as to their needs for microbial and chemical contaminant analyses to assist with determining the harvestability of molluscan shellfish (predominantly oysters) in those areas where the resource was not decimated by the storm. Pending funding, analyses will include fecal coliform bacteria and other potential human pathogens as well as chemical contaminants that may have been mobilized by the storm. NCCOS will provide support for these analyses.

4.2 Collaboration with NOAA/ORR:

NCCOS and ORR have just initiated discussions pertaining to this component. Because key ORR personnel are currently in the affected region, the planning is still underway. A key component of this work, however, will be an expanded NS&T Mussel Watch effort. Because of the extraordinary nature of this natural disaster and associated impacts, NS&T has briefly discussed with its ORR partners a strategy to measure contaminants in the region with increased frequency (quarterly) over an overall three year horizon. If the Program is able to achieve this ambitious post-impact monitoring schedule, it will result in robust estimates of sediment and tissue contamination for the region that can be used to evaluate short-term trends in the context of a well established historical record at these sites. Furthermore, funding permitting, NS&T will sample the benthic infauna at these locations during the 3-year period to construct a time series documenting changes in the biological community structure in response to contamination and physical-forcing mechanisms. To complement this work, a series of bioassays will be performed to estimate sediment toxicity levels as part of an integrated assessment of the biological effects of contamination that has resulted from the storm. The combined activities outlined here will compliment the proposed series of activities planned by EPA and its partners in the waters off LA, MS, and AL, and will add a critical component to the larger characterization of Katrina's impacts.